

CLAIMS

1. A light emitting element comprising:
 - a first layer;
 - 5 a second layer; and
 - a third layer,
wherein the first, second and third layers are interposed between mutually-facing first and second electrodes,
wherein the first layer contains a first substance of which a ratio of any one of
 - 10 an electron mobility and a hole mobility to the other one is 100 or less, and a second substance exhibiting an electron accepting ability with respect to the first substance,
wherein the second layer contains a third substance of which a ratio of any one of an electron mobility and a hole mobility to the other one is 100 or less, and a fourth substance exhibiting an electron donating ability with respect to the third substance,
15 wherein the third layer contains a light emitting substance,
wherein the first, second and third layers are sequentially laminated,
wherein the first layer is in contact with the first electrode,
wherein the third layer is in contact with the second electrode, and
wherein when a voltage is applied to the light emitting element such that a
 - 20 potential of the second electrode is higher than that of the first electrode, the light emitting element emits light.

2. A light emitting element comprising:

a first layer;

a second layer; and

a third layer,

wherein the first, second and third layers are interposed between

5 mutually-facing first and second electrodes,

wherein the first layer contains a first substance of which a ratio of any one of an electron mobility and a hole mobility to the other one is 100 or less, and a second substance exhibiting an electron accepting ability with respect to the first substance,

10 wherein the second layer contains a third substance of which a ratio of any one of an electron mobility and a hole mobility to the other one is 100 or less, and a fourth substance exhibiting an electron donating ability with respect to the third substance,

wherein the third layer contains a light emitting substance,

wherein the first layer is provided to be closer to the first electrode than the second layer,

15 wherein the third layer is provided to be closer to the second electrode than the second layer, and

wherein when a voltage is applied to the light emitting element such that a potential of the second electrode is higher than that of the first electrode, the light emitting element emits light.

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3. The light emitting element according to claim 1 or claim 2, wherein the first layer contains the second substance such that a molar ratio of the second substance to the first substance is 0.5 or more and 2 or less.

4. A light emitting element comprising:

5 a first layer;

 a second layer; and

 a third layer,

 wherein the first, second and third layers are interposed between mutually-facing first and second electrodes,

 wherein the first layer contains a first substance expressed by either a general

10 formula 1 or a general formula 2, and a second substance exhibiting an electron accepting ability with respect to the first substance,

 wherein the second layer contains a third substance expressed by either the general formula 1 or the general formula 2, and a fourth substance exhibiting an electron donating ability with respect to the third substance,

15 wherein the third layer contains a light emitting substance,

 wherein the first, second and third layers are sequentially laminated,

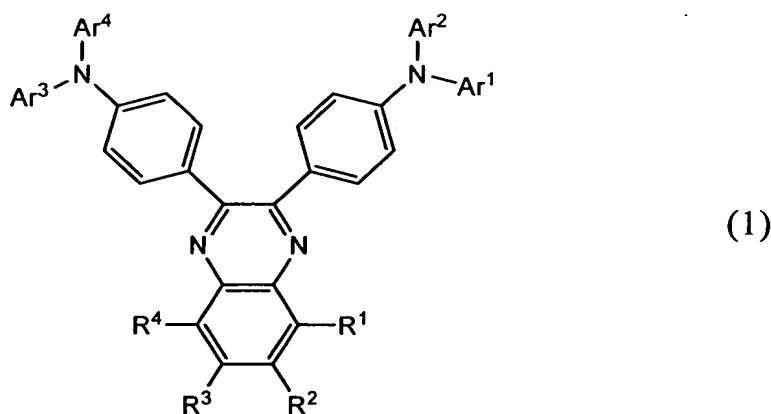
 wherein the first layer is in contact with the first electrode,

 wherein the third layer is in contact with the second electrode, and

 wherein when a voltage is applied to the light emitting element such that a

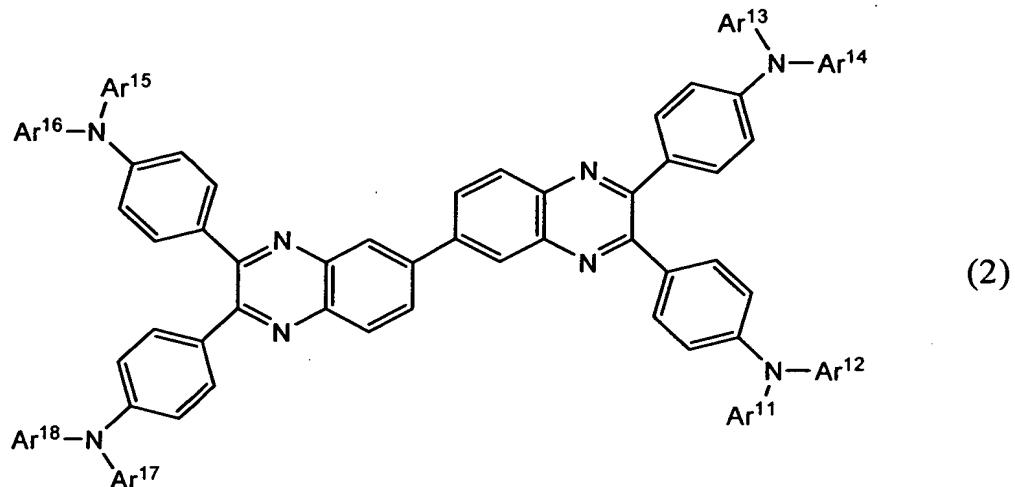
20 potential of the second electrode is higher than that of the first electrode, the light emitting element emits light.

[General Formula 1]



(in the general formula 1, R¹ to R⁴ each independently represent either hydrogen or an alkyl group. Alternatively, a bond of R¹ and R², a bond of R² and R³, and a bond of R³ and R⁴ represent aromatic rings, respectively. Ar¹ to Ar⁴ each independently represent an aryl group having 6 to 14 carbon atoms.)

[General Formula 2]



(in the general formula 2, Ar¹¹ to Ar¹⁴ each independently represent an aryl group having 6 to 14 carbon atoms.)

5. A light emitting element comprising:

a first layer;

a second layer; and

a third layer,

wherein the first, second and third layers are interposed between

5 mutually-facing first and second electrodes,

wherein the first layer contains a first substance expressed by either a general formula 1 or a general formula 2, and a second substance exhibiting an electron accepting ability with respect to the first substance,

wherein the second layer contains a third substance expressed by either the

10 general formula 1 or the general formula 2, and a fourth substance exhibiting an electron donating ability with respect to the third substance,

wherein the third layer contains a light emitting substance,

wherein the first layer is provided to be closer to the first electrode than the

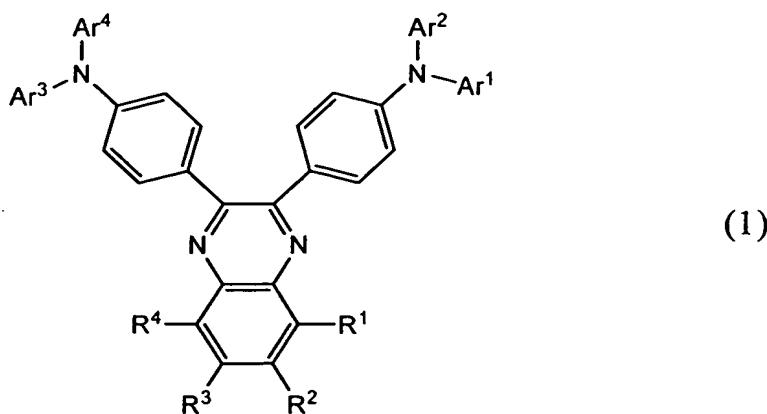
second layer,

15 wherein the third layer is provided to be closer to the second electrode than the

second layer, and

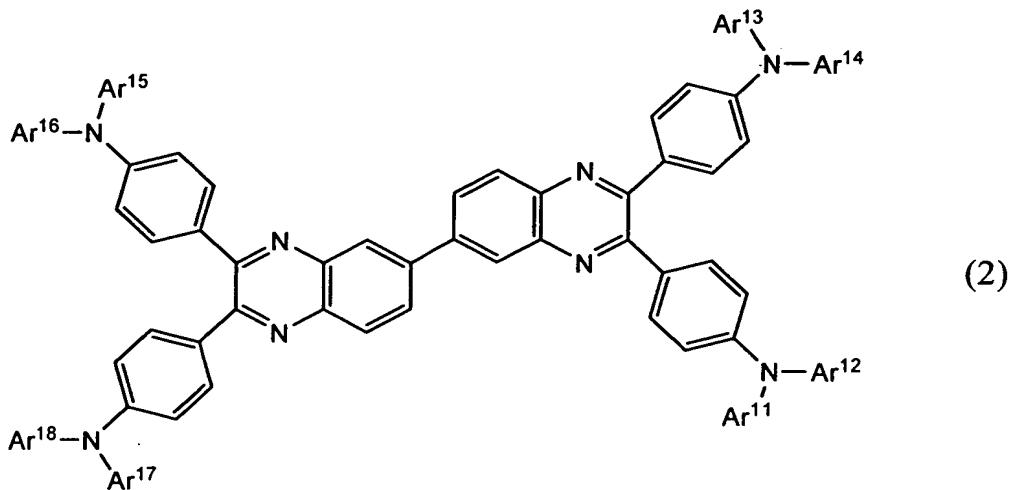
wherein when a voltage is applied to the light emitting element such that a potential of the second electrode is higher than that of the first electrode, the light emitting element emits light.

20 [General Formula 1]



(in the general formula 1, R¹ to R⁴ each independently represent either hydrogen or an alkyl group. Alternatively, a bond of R¹ and R², a bond of R² and R³, and a bond of R³ and R⁴ represent aromatic rings, respectively. Ar¹ to Ar⁴ each independently represent an aryl group having 6 to 14 carbon atoms.)

[General Formula 2]



(in the general formula 2, Ar¹¹ to Ar¹⁴ each independently represent an aryl group having 6 to 14 carbon atoms.)

substance is identical to the third substance.

7. A light emitting element comprising:

5 a first layer containing a first substance of which a ratio of any one of an electron mobility and a hole mobility to the other one is 100 or less; and

a second layer containing a light emitting substance,

wherein the first and second layers are interposed between mutually-facing first and second electrodes,

10 wherein the first layer includes a first region containing a second substance that exhibits an electron accepting ability with respect to the first substance, and a second region containing a third substance that exhibits an electron donating ability with respect to the first substance,

wherein the first region is provided to be closer to the first electrode than the 15 second region, and

wherein when a voltage is applied to the light emitting element such that a potential of the second electrode is higher than that of the first electrode, the light emitting element emits light.

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8. A light emitting element comprising:

a first layer containing a first substance expressed by either a general formula 1 or a general formula 2; and

a second layer containing a light emitting substance,

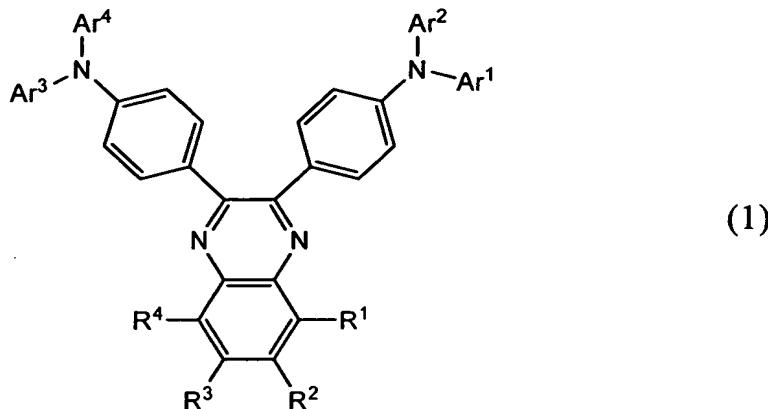
wherein the first and second layers are interposed between mutually-facing first and second electrodes,

wherein the first layer includes a first region containing a second substance that exhibits an electron accepting ability with respect to the first substance, and a second 5 region containing a third substance that exhibits an electron donating ability with respect to the first substance,

wherein the first region is provided to be closer to the first electrode than the second region, and

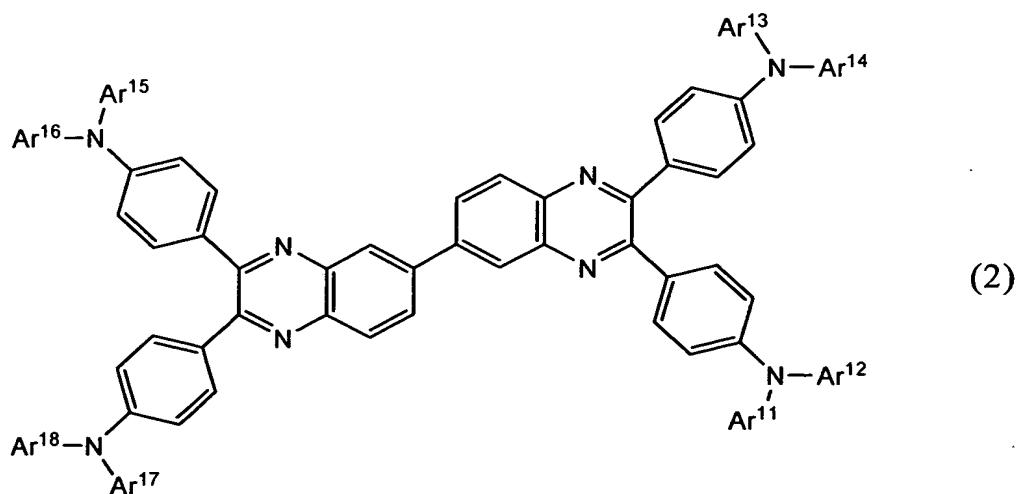
wherein when a voltage is applied to the light emitting element such that a 10 potential of the second electrode is higher than that of the first electrode, the light emitting element emits light.

[General Formula 1]



(in the general formula 1, R¹ to R⁴ each independently represent either hydrogen or an 15 alkyl group. Alternatively, a bond of R¹ and R², a bond or R² and R³, and a bond of R³ and R⁴ represent aromatic rings, respectively. Ar¹ to Ar⁴ each independently represent an aryl group having 6 to 14 carbon atoms.)

[General Formula 2]



(in the general formula 2, Ar¹¹ to Ar¹⁴ each independently represent an aryl group having 6 to 14 carbon atoms.)

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9. The light emitting element according to claim 7 or claim 8, wherein the first layer contains the second substance or the third substance such that a molar ratio of the second substance or the third substance to the first substance is 0.5 to 2.

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10. A light emitting element comprising:

a first layer;

a second layer; and

a third layer,

15 wherein the first, second and third layers are interposed between mutually-facing first and second electrodes,

wherein the first electrode is formed using a conductive material having a reflectance of 50% or more and 100% or less,

wherein the second electrode is formed using a conductive material that can transmit visible light,

wherein the first layer contains a first substance of which a ratio of any one of an electron mobility and a hole mobility to the other one is 100 or less, and a second 5 substance exhibiting an electron accepting ability with respect to the first substance,

wherein the second layer contains a third substance of which any one of an electron mobility and a hole mobility to the other one is 100 or less, and a fourth substance exhibiting an electron donating ability with respect to the third substance,

wherein the third layer contains a light emitting layer and includes x pieces of 10 layers (x is an arbitral positive integer),

wherein the first, second and third layers are sequentially laminated,

wherein the first layer is in contact with the first electrode,

wherein one layer included in the third layer is in contact with the second layer,

wherein the x-th layer included in the third layer is in contact with the second 15 electrode,

wherein y pieces of layers (y < x, y is a positive integer) are interposed between the light emitting layer and the second layer,

wherein when a voltage is applied to the light emitting element such that a potential of the second electrode is higher than that of the first electrode, the light 20 emitting element emits light, and

wherein a thickness of the first layer and a thickness of the second layer are adjusted to satisfy an expression 1, an expression 2 and an expression 3:

[Expression 1]

$$n_i d_i + n_{ii} d_{ii} + \sum_{k=1}^y n_k d_k + n_j d_j = \frac{(2m-1)\lambda}{4}$$

[Expression 2]

$$0 \leq d_j \leq d_{emi}$$

[Expression 3]

5 $d_i \geq d_{ii}$

wherein, n_i represents a refractive index of the first layer; d_i , a thickness of the first layer; n_{ii} , a refractive index of the second layer; d_{ii} , a thickness of the second layer; n_k , a refractive index of a k -th layer (k is a natural number) of the layers between the light emitting layer and the second layer; d_k , a thickness of the k -th layer of the layers 10 between the light emitting layer and the second layer; n_j , a refractive index of the light emitting layer; d_j , a distance from an interface between the light emitting layer and the first electrode to a light emitting region; λ , a wavelength of light emission from the light emitting element; m , an arbitral positive integer; and d_{emi} , a thickness of the light emitting layer.

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11. A light emitting device, wherein a pixel portion includes the light emitting element according to any one of claim 1 through claim 10.

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12. An electronic appliance, wherein a display portion includes the light emitting element according to claim 11.